COMPOSTING SOLID WASTE IN OVERSEAS CONTINGENCY OPERATIONS

Joseph Bost, Chief, Engineer Support Operations, HQ USAREUR, US Army
James F. Lee, Environmental Officer, ODCSENG, HQ USAREUR, US Army
Unit 29351, APO AE 09014-9351

Dr. Markus Binding, Managing Director, Comp-Any GmbH
Mr. Jan Gressmann, Managing Director, Comp-Any GmbH
Graf-Seinsheim-Strasse 16
D-85461 Grunback, Germany

ABSTRACT

A technology trial is being conducted at Camp Bondsteel, Kosovo during the fall of 2004 that may offer new possibilities for solid waste management at overseas military locations, most particularly contingency operations (CONOPS). Alternative solid waste management methods will be compared for cost, operational impact and overall performance. US Army, Europe led by the Office of the Deputy Chief of Staff, Engineer has teamed with their base support contractor, Kellogg Brown and Root Inc. and a European firm, Comp-Any GmbH, to conduct a technology trial in Kosovo that will track the performance of open windrow composting compared to Gore-Tex membrane covered aerated static heap, currently in existence are trash burning and burial operations. Representatives of the three participating parties intend to present the findings of this trial at the Army Science Conference in December 2004.

1. INTRODUCTION

US Army troops serving in overseas contingency operations generate significant amounts of municipal solid waste. Waste must be managed to avoid potential health hazards or environmental consequences that could expose the US government to claims resulting from pollution. The US Army, Europe is committed to protecting the soldier and the environment and thus always looks for ways to improve the efficiency of downrange base camps. Additionally, force protection issues/concerns diminish greatly when solid waste can be processed "on site", at the base camp. This minimizes unnecessary vehicles coming on or off the base associated solely with waste management or waste control.

Army base camps are typically set up quickly and often operate for as little as a few months or as long as several years. All base camps are considered "temporary"; some have been in existence for more than 5-7 years. Solid waste management, regardless of the size of the camp, has been a constant challenge. Many of the goods used in base camps are disposable and are delivered to the camp with significant amounts of packaging. Wherever US Army troops are operating and living, there is always a significant waste management challenge. The farther Army base camps are located away from traditional/developed sources of waste disposal services; the greater the need for self sustainable and affordable disposal practices that protect troops and the environment.

1.1 SOLID WASTE MANAGEMENT

Currently, un-separated trash is collected at Camp Bondsteel and transported to a waste disposal burning site. The base support contractor then burns the un-separated garbage. After burning, ash is removed from the burn box and cooled with water prior to being trucked to a solid waste landfill. The garbage burning operation is somewhat effective in reducing volume and vector attraction. However, the smoke generated by the operation draws numerous complaints from soldiers and civilians living at Camp Bondsteel. Transportation and tipping costs as well as finding an approved landfill site often presents significant associated problems.

Smoke from the Bondsteel waste burning operation was one of the main factors that drove the search for alternative solid waste management technologies. An open windrow composting operation was started in June 2004, (after a trial compost was executed in winter/ spring '03) that was primarily targeted at processing over 1,200 cubic meters of stockpiled sewage sludge cake that had accumulated due to a lack of off-site disposal options. The open windrow composting operation is still operating and has expanded its scope of operation to include food waste from dining facilities and commercial dining establishments located on base. The eventual goal of the composting effort is to gradually include as much of the total solid waste stream (the organic portion of base camp solid waste and sewage sludge cake) as possible, to allow for the shut down of the garbage burning operation and convert the composted waste into a useful product.

Report Documentation Page

Form Approved
OMB No. 0704-0188

Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
00 DEC 2004	**N/A**	**-**

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
Composting Solid Waste In Overseas Contingency Operations	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **Engineer Support Operations, HQ USAREUR, US Army; ODCSENG, HQ USAREUR, US Army Unit, 29351 APO AE 09014-9351**	8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release, distribution unlimited

13. SUPPLEMENTARY NOTES
See also ADM001736, Proceedings for the Army Science Conference (24th) Held on 29 November - 2 December 2005 in Orlando, Florida.

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			
unclassified	**unclassified**	**unclassified**	**UU**	**3**	

The open windrow composting technology that was started at Camp Bondsteel in June 2004 worked well to process stockpiled sewage sludge cake. However, as additional waste streams such as food waste were added into the windrow, attraction to vectors increased. A more robust technology was desired that could reduce vector attraction and consistently transform organic waste into a usable product in all seasons and climates. The criteria for the desired system was (1) effective/sustained year round capability, (2) portability, (3) scalability (easily expanded or contracted as a function of ever changing soldier population) as while achieving a (4) low operations and maintenance footprint. Agile Flex was selected for a 90 day trial for evaluation.

1.1.1 EFFECTIVENESS

The effectiveness of the composting technology will be measured by waste reduction and analyzing compost quality and ultimate use. Waste reduction is achieved in this case when waste is converted into beneficial product providing actual value to the Army mission. Stable compost can be applied to areas damaged by erosion or blended with native soil and gravel to produce a manufactured soil product which can be used as backfill to mitigate and control erosion on the base camp. Erosion occurs on Army base camps due to heavy vehicle traffic and changes to the surface due to temporary building construction. Effectiveness will be measured by calculating the total percentage of the solid waste stream that can be converted into compost. Samples of compost will be analyzed through out the evaluation period for stability, pathogen presence, heavy metals and vector reduction. The selected system will be monitored for temperature, oxygen content and blower run-time. In an earlier (Feb 03-Jul 03)compost trial at Camp Bondsteel, inclement weather conditions including heavy rain and snow greatly hampered compost operations. This earlier trial underscored the requirement for a compost capability that was unimpeded by unfavorable weather conditions. Also required was a system that reduced off-site or off-base transportation requirements, thus minimizing force protection requirements/concerns and ultimately reducing US force vulnerability when outside the confines of the base camp.

1.1.2 PORTABILITY

The portability of the composting technology will be measured by simple factors such as shipping requirements and cost. The US Army frequently uses standard sized ISO inter-modal shipping containers to haul goods and equipment to various parts of the world. If a technology can be shipped through existing shipping assets, it is a plus for the Army mission. Several competing composting technologies utilize standard ISO shipping containers to transport their technology. Portability, as a response to ever changing force requirements theater wide, attaches a tremendous premium on equipment that can be readily transported using standard theater level transportation means.

1.1.3 SCALABILITY

The scalability of a composting unit is an important factor due to the fact that Army basecamps follow many varied patterns of design and population/footprint. Although some base camp design criteria are closely followed, specific base camp design is a function of the specific mission of the Army organization that it supports. Army base camp/forward operating base populations for the Balkans have ranged in size from 5,000 down to 125 personnel. A composting technology will be measured by how easily a composting unit capable of supporting a small troop population can be expanded to serve the requirements of a larger population for a time period and then scaled down again as necessary.

1.1.4 O&M FOOTPRINT

The soldier to base support contractor ratio in a base camp is a significant factor to Army leaders due to cost, security footprint, utility demands and contracting simplicity. A measure of operations and maintenance footprint would be whether or not more man hours are required to run the composting operation and residual waste operation than are required to operate the waste burning /land fill operation. Another measure is the site preparation effort (and attendant cost) required for the composting technology to operate. That level of effort includes utilities such as electrical power and surface preparation and water run off management. Lastly, a composting technology should be measured by how much specialized equipment and training necessary is required for daily operation. In other words, can the same equipment that is ordinarily found on Army basecamps be used to handle the compost material or is special equipment/training needed that requires special maintenance skills and non-standard replacement parts?

2. TECHNOLOGY COMPARRISON

The open windrow composting technology is to be considered a composting benchmark for measuring criteria and cost. The limitations of the open windrow in CONOPS are well known. By using the data collected from the open windrow process as a reference point, an in-vessel system can be compared both in time and cost to complete the compost process. After 90 days of operations a true compost production cost will be established that includes equipment, consumables and labor. Several important factors such as space required

to operate, days required to process waste from input to completion as a usable product, effectiveness in pathogen reduction, and quality of compost produced will be published in a final report.

3. CONCLUSIONS

Although this project is still in progress, the results of the study may be of special interest to other major commands involved in contingency operations worldwide. It is well known that solid waste management in deployed areas of operations/CONOPS has continued to be a challenge. Semi- permeable membrane composting technology may be one of the keys to helping the Army implement a more sustainable/self contained solid waste management operation.